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TITLE: Adhesive block ethylenic copolymers, cosmetic compositions containing them and cosmetic use of these copolymers

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CLAIMS:

1. Linear block ethylenic copolymer, comprising: at least two blocks having different glass transition temperatures (T_g); at least one of these blocks having a glass transition temperature of less than or equal to 20.degree. C.; the said copolymer also having an adhesion or "tack" value of greater than 1N.
2. Copolymer according to claim 1, which is a film-forming copolymer.
3. Copolymer according to claim 1, the adhesion or "tack" value of which is greater than 2N.
4. Copolymer according to claim 3, the adhesion or "tack" value of which is greater than 3N.
5. Copolymer according to any of one of claims 1 to 4, in which the difference in glass transition temperatures (T_g) between the two blocks having different glass transition temperatures is from 40 to 120.degree. C.
6. Copolymer according to claim 5, in which the difference in glass transition temperatures (T_g) between the two blocks having different glass transition temperatures is from 40 to 110.degree. C.
7. Copolymer according to claim 6, in which the difference in glass transition temperatures (T_g) between the two blocks having different glass transition temperatures is from 40 to 100.degree. C.
8. Copolymer according to any one of claims 1 to 7, the number-average mass of which is from 10,000 to 500,000 and preferably from 50,000 to 200,000.
9. Copolymer according to any one of claims 1 to 8, in which the proportion of the block with a glass transition temperature of less than or equal to 20.degree. C. is from 99% to 40% by mass of the copolymer.
10. Copolymer according to claim 9, in which the proportion of the block with a glass transition temperature of less than or equal to 20.degree. C. is from 95% to 55% and preferably 90% to 50% by mass of the copolymer.

11. Copolymer according to any one of claims 1 to 10, for which the block with a Tg of less than or equal to 20.degree. C. has a Tg from 20.degree. C. to -100.degree. C.

12. Copolymer according to claim 11, for which the block with a Tg of less than or equal to 20.degree. C. has a Tg from 20.degree. C. to -95.degree. C. and preferably from 20 to -90.degree. C.

13. Copolymer according to any one of claims 1 to 12, which the block with a Tg of less than or equal to 20.degree. C., which is a homopolymer or a copolymer, is totally or partly derived from one or more monomers, which are such that the homopolymers prepared from these monomers have glass transition temperatures of less than or equal to 20.degree. C.

14. Copolymer according to claim 13, in which the block whose glass transition temperature is less than or equal to 20.degree. C. is a homopolymer consisting of a single type of monomer of Tg.ltoreq.20.degree. C.

15. Copolymer according to claim 13 or claim 14, in which the monomers whose homopolymers have glass transition temperatures of less than or equal to 20.degree. C. are chosen from the following monomers: ethylenic hydrocarbons of 2 to 10 C, such as ethylene, isoprene and butadiene; acrylates of formula $\text{CH}_2=\text{CHCOOR}$, R representing a linear or branched 1 to 12 C alkyl group with the exception of a tert-butyl group, in which one or more hetero atoms chosen from O, N and S is(are) optionally inserted, the said alkyl group also possibly being optionally substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F), or R represents a C₁-C₁₂ alkyl-POE (polyoxyethylene) with repetition of the oxyethylene unit from 5 to 30 times, for example methoxy POE, or R represents a polyoxyethylene group comprising from 5 to 30 ethylene oxide units; the methacrylates of formula: $\text{CH}_2=\text{C}(\text{R})\text{COOR}$, R representing a linear or branched 3 to 12 C alkyl group, in which one or more hetero atoms chosen from O, N and S is(are) optionally inserted, the said alkyl group possibly also being optionally substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F); the vinyl esters of formula: $\text{CH}_2=\text{CHCOOR}$, in which R represents a linear or branched 2 to 12 C alkyl group; vinyl ethers of a 1 to 12 C alkyl, such as methyl vinyl ether and ethyl vinyl ether; N-(1 to 12 C)alkyl acrylamides, such as N-octylacrylamide.

16. Copolymer according to either of claims 13 and 15, in which the block with a glass transition temperature of less than or equal to 20.degree. C. comprises, besides the monomer(s) for which the glass transition temperatures of the homopolymers prepared therefrom are less than or equal to 20.degree. C., one or more other different monomers or additional monomers.

17. Copolymer according to claim 15, in which the said additional monomer(s) is(are) chosen from the following monomers: the vinyl compounds of formula: $\text{CH}_2=\text{CH-R}$, in which R is a hydroxyl group; a group 5 a C₃ to C₈ cycloalkyl group; a C₆ to C₂₀ aryl group; a C₇ to C₃₀ aralkyl group (C₁ to C₄ alkyl); a 4- to 12-membered heterocyclic group containing one or more hetero atoms chosen from O, N and S; a heterocycl-alkyl group (C₁ to C₄ alkyl) such as a furfuryl group; the said cycloalkyl, aryl, aralkyl, heterocyclic or heterocyclalkyl groups possibly being optionally substituted with one or more substituents chosen from hydroxyl groups, halogen atoms and linear or branched 1 to 4 C alkyl groups in which is(are) optionally inserted one or more hetero atoms chosen from O, N, S and P, and the said alkyl groups also possibly being optionally substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F); the acrylates of formula: $\text{CH}_2=\text{CHCOOR}$, in which R is a tert-butyl group; a C₃ to C₈ cycloalkyl group; a C₆ to C₂₀ aryl group; a C₇ to C₃₀ aralkyl group (C₁ to C₄ alkyl); a 4- to 12-membered heterocyclic group containing one or more hetero atoms chosen from O, N and S; a heterocyclalkyl group (C₁ to C₄ alkyl), such as a furfuryl group; the said cycloalkyl, aryl, aralkyl, heterocyclic or heterocyclalkyl groups possibly being optionally substituted with one or more substituents chosen from hydroxyl

groups, halogen atoms and linear or branched 1 to 4 C alkyl groups in which is(are) optionally inserted one or more hetero atoms chosen from O, N, S and P, the said alkyl groups also possibly being optionally substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F); the methacrylates of formula: $\text{CH}_2=\text{C}(\text{CH}_3)\text{COOR}$ in which R is a linear or branched 1 to 4 C alkyl group, such as a methyl, ethyl, propyl or isobutyl group, the said alkyl group also possibly being optionally substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F); a C₃ to C₈ cycloalkyl group; a C₆ to C₂₀ aryl group; a C₇ to C₃₀ aralkyl group (C₁ to C₄ alkyl group); a 4- to 12-membered heterocyclic group containing one or more hetero atoms chosen from O, N and S; a heterocyclalkyl group (1 to 4 C alkyl), such as a furfuryl group; the said cycloalkyl, aryl, aralkyl or heterocyclic or heterocyclalkyl groups possibly being optionally substituted with one or more substituents chosen from hydroxyl groups, halogen atoms and linear or branched 1 to 4 C alkyl groups in which is(are) optionally inserted one or more hetero atoms chosen from O, N, S and P, the said alkyl groups also possibly being optionally substituted with one or more substituents chosen from hydroxyl groups and halogen atoms (Cl, Br, I and F); the (meth)acrylamides of formula: $\text{CH}_2=\text{C}(\text{R}_7)\text{CONHR}_8$ in which R₇ and R₈, which may be identical or different, each represent a hydrogen atom or a linear or branched alkyl group of 1 to 12 carbon atoms, such as an n-butyl, t-butyl, isopropyl, isohexyl, isoctyl or isononyl group, and R' denotes H or methyl.

18. Copolymer according to claim 16 or claim 17, in which the said additional monomer(s) is(are) present in an amount of less than or equal to 50% by weight of the block with a Tg of less than or equal to 20.degree. C.

19. Copolymer according to claim 18, in which the said monomer(s) is(are) present in an amount of less than or equal to 45% by weight and preferably less than or equal to 40% by weight of the block with a Tg of less than or equal to 20.degree. C.

20. Copolymer according to any one of claims 16 to 19, in which the block with a Tg of less than or equal to 20.degree. C. is formed from a copolymer consisting of a first monomer for which the Tg of the corresponding homopolymer is in the range from more than 20.degree. C. to 200.degree. C. and preferably from more than 20.degree. C. to 120.degree. C., and of a second monomer for which the Tg of the corresponding homopolymer is in the range from 20.degree. C. to -100.degree. C.

21. Copolymer according to any one of claims 1 to 20, comprising at least one hydrophilic block which comprises hydrophilic monomers.

22. Copolymer according to claim 21, in which the said hydrophilic block is a block with a glass transition temperature of greater than 20.degree. C.

23. Copolymer according to claim 21, in which the hydrophilic block is a block with a glass transition temperature of less than or equal to 20.degree. C.

24. Copolymer according to claim 21, the hydrophilic block of which comprises one or more hydrophilic monomer(s) whose corresponding homopolymers have glass transition temperatures of greater than 20.degree. C. and one or more other non-hydrophilic monomer(s) chosen especially from those whose homopolymers have Tg values of less than or equal to 20.degree. C.

25. Copolymer according to claim 22 and claim 24, in which the hydrophilic block comprises from 70% to 100% and preferably from 80% to 100% of hydrophilic monomers for which the Tg values of the corresponding homopolymers are greater than 20.degree. C.

26. Copolymer according to claim 22 and claim 23, in which the hydrophilic block comprises from 10% to less than 70% and preferably from 20% to 65% of hydrophilic monomers for which the Tg values of the corresponding homopolymers are greater than 20.degree. C.

27. Copolymer according to any one of claims 21 to 26, in which the hydrophilic monomers are chosen from cationic monomers, anionic monomers and nonionic monomers.

28. Copolymer according to claim 27, in which the cationic monomers are chosen from 2-vinylpyridine; 4-vinylpyridine; dimethylaminoethyl methacrylate (DMAEMA); diethylaminoethyl methacrylate (DEAEMA); dimethylaminopropylacrylamide; and salts thereof.

29. Copolymer according to claim 27, in which the anionic monomers are chosen from acrylic acid, methacrylic acid, crotonic acid, maleic anhydride, itaconic acid, fumaric acid, maleic acid, styrenesulphonic acid, acrylamidopropanesulphonic acid, vinylbenzoic acid and vinylphosphonic acid, and salts thereof.

30. Copolymer according to claim 27, in which the nonionic monomers are chosen from: hydroxyalkyl (meth)acrylates in which the alkyl group contains from 2 to 4 carbon atoms, in particular hydroxyethyl (meth)acrylate; vinyl lactams; (meth)acrylamide and N-(C.sub.1 to C.sub.4)alkyl(meth)-acrylamides, for instance isobutylacrylamide; polysaccharide (meth)acrylates, for instance sucrose acrylate.

31. Copolymer according to any one of claims 1 to 30, chosen from diblock copolymers, triblock copolymers and multiblock copolymers containing more than three blocks.

32. Copolymer according to claim 31, which is a multiblock copolymer, in which one or two blocks have a T_g of less than or equal to 20.degree. C. and the other blocks have a T_g of greater than 20.degree. C. and less than 20.degree. C.

33. Cosmetic composition comprising the copolymer according to any one of claims 1 to 32.

34. Cosmetic composition according to claim 33, containing from 0.1% to 60% by weight, preferably from 5% to 50% by weight and more preferably from 1% to 40% by weight of the copolymer.

35. Composition according to either of claims 33 and 34, comprising, besides the said copolymer, a physiologically acceptable medium in which the copolymer is in dissolved or dispersed form.

36. Composition according to any one of claims 33 to 35, in which the physiologically acceptable medium comprises one or more suitable solvents forming a hydrophilic phase chosen from water and mixtures of water and of hydrophilic organic solvent(s), such as alcohols and especially linear or branched lower monoalcohols containing from 2 to 5 carbon atoms, for instance ethanol, isopropanol, or n-propanol, and polyols, for instance glycerol, diglycerol, propylene glycol, sorbitol, pentyleneglycol and polyethylene glycols.

37. Composition according to claim 36, in which the hydrophilic phase also contains hydrophilic C.sub.2 ethers and C.sub.2 to C.sub.4 aldehydes.

38. Cosmetic composition according to any one of claims 33 to 37, in which the said physiologically acceptable medium also comprises a fatty phase composed of fatty substances that are liquid or solid at room temperature, of animal, plant, mineral or synthetic origin.

39. Composition according to any one of claims 33 to 38, also comprising one or more cosmetically acceptable organic solvents.

40. Cosmetic composition according to any one of claims 33 to 39, in which the said physiologically acceptable medium also comprises one or more auxiliary film-forming agents chosen from plasticizers and coalescers.

41. Cosmetic composition according to any one of claims 33 to 40, also comprising one or more dyestuffs chosen from water-soluble dyes and pulverulent dyestuffs, for instance pigments, nacres and flakes.

42. Composition according to any one of claims 33 to 41, also comprising fillers.

43. Cosmetic composition according to any one of claims 33 to 42, also comprising one or more ingredients commonly used in cosmetics, such as vitamins, thickeners, trace elements, softeners, sequestering agents, fragrances, acidifying or basifying agents, preserving agents, sunscreens, surfactants, antioxidants, agents for preventing hair loss, antidandruff agents and propellants, or mixtures thereof.

44. Cosmetic composition according to any one of claims 33 to 43, characterized in that it is in the form of a suspension, a dispersion, a solution, a gel, an emulsion, especially an oil-in-water (O/W) or water-in-oil (W/O) emulsion, or a multiple emulsion (W/O/W or polyol/O/W or O/W/O emulsion), in the form of a cream, a paste, a mousse, a dispersion of vesicles, especially of ionic or nonionic lipids, a two-phase or multi-phase lotion, a spray, a powder or a paste, especially a soft paste or an anhydrous paste.

45. Cosmetic composition according to any one of claims 33 to 44, characterized in that it is a hair product, such as a lacquer or a shampoo.

46. Cosmetic composition according to any one of claims 33 to 44, characterized in that it is a makeup composition, such as a nail varnish.

47. Cosmetic process for making up or caring for keratin materials, comprising the application to the keratin materials of a cosmetic composition according to one of claims 33 to 46.

48. Use of the copolymer according to any one of claims 1 to 32, to improve the styling power and the hold of a hair lacquer.

49. Use according to any one of claims 1 to 32, to increase the adhesion of a nail varnish.

50. Use according to any one of claims 1 to 32, to improve the hold and adhesion of a makeup composition.